Xi'an Shiyou Daxue Xuebao (Ziran Kexue Ban)/
Journal of Xi'an Shiyou University, Natural Sciences Edition
ISSN: 1673-064X
E-Publication: Online Open Access
Vol: 66 Issue 07 | 2023
DOI 10.17605/OSF.IO/PF5D2

STUDY OF HELICOBACTER PYLORI LINKED WITH INTESTINAL INFECTION IN PATIENTS

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Abstract

Helicobacter pylori is directly linked with intestinal infections like peptic ulcers, duodenal ulcers, and stomach ulcers. There are many developing countries where due to unhygienic conditions, this pathogen cause many diseases. This study was done at Jinnah International Hospital Abbottabad from 2020 to 2022. All the data was collected directly from the physicians and some information was collected by questionnaire like lifetime history, potential risk factors, and specific antibody measurements of *H. pylori* infection. About 330 patients (male and female) were investigated for peptic ulcer disorder (PUD) and gastrointestinal infections. The study showed that the frequency of PUD was more discovered in male patients than in female patients. The history of lifestyle, usage of different medications, and also food and sleeping pattern were involved in the development of PUD and similar infection. There is a 2.8% increase in PUD and gastrointestinal infections every year.

Keywords: Helicobacter Pylori, Gastric Ulcer, Cytotoxicity, Frequency

INTRODUCTION

In the general population, gastrointestinal problems are very common. The most prevalent upper gastrointestinal symptom complex is dyspepsia, which affects 25% of the general population. Uncertain infectious and non-infectious factors are likely to be the causes of dyspepsia (Fujioka et al., 2003). Common causes of dyspepsia include celiac disease, *Giardia lamblia*, and *Helicobacter pylori (H. pylori)*. The significance of polymicrobial causes of upper gastrointestinal disorders has lately increased, and synergism is a significant factor in dyspepsia. According to estimates, more than 50% of people worldwide are infected with *H. pylori*, with developing nations like those in Africa having the highest load. Additionally, *G. lamblia* has a global distribution, affecting 200

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million individuals worldwide, and 500,000 new cases are reported each (Fujioka et al., 2003; Seid et al., 2018). Also sharing a similar route of transmission and having a substantial correlation with socioeconomic status, Urease, which is manufactured *by H. pylori,* facilitates the survival of intestinal parasites and bacteria in the stomach's acidic environment. Furthermore, to *H. pylori* infection, it discovered that *G. lamblia* can cause symptoms of gastrointestinal problems, with dyspepsia being one of the primary signs of gastric giardiasis (Huang et al., 2002; Week et al., 2009).

Peptic ulcer disease

It is expected that 10% of those with *H. pylori* infection will develop PUD in their lifetime. In comparison to 1% of those without the illness, more than 11% of those with the virus acquire PUD after 10 years 45. In a prospective investigation, people infected with cagA-positive *H. pylori* strains had a peril of duodenal ulcer and stomach ulcer development that was respectively elevated by 18.4-fold and 2.9-fold (Ho et al., 2022; Huang et al., 2002). *H. pylori* continues to be the most common cause of PUD despite shifting global patterns in PUD. According to a Danish study, there is an odds ratio of 4.3 (95% confidence interval: 2.2 to 8.3) for the association between *H. pylori* infection and Peptic ulcer disease (Liang et al., 2022). The summed prevalence of Peptic ulcer disease was 6.8% in an analysis of unselected population samples from Europe and China 58. *H. pylori* infections are thought to be responsible for over 3,000,000 PUD diagnosis each year, and depending on where you live, different percentages of people with duodenal and gastric ulcers and *H. pylori* infections can be found (Schöttker et al., 2012).

According to studies, the prevalence of PUD has been decreasing over the last few decades. Peptic ulcer disease encompasses both duodenal and stomach ulcers, each with its etiology. As a result, whereas gastric ulcer disease is more likely to be caused by immunopathogenesis, duodenal ulcer disease is more likely to be caused by acid (Schöttker et al. 2012). Nonetheless, PUD remains a significant cause of death and, in some cases, a primary cause of death due to complications such as ulcer perforation or hemorrhage. In 2004, a cohort of approximately 6,000 symptomatic middle-aged male manufacturing employees was formed to investigate the issues surrounding the development of stomach cancer in *H. pylori*-related chronic gastritis (Weck and Brenner 2008). An alternate method could be to adopt a definition based on its capacity to identify connections with well-known significant risk variables because a decision based on sensitivity and specificity is problematic because there is no genuine gold standard (Zhang et al. 2013). The Duodenal ulcer is mostly a Helicobacter pylori-related condition, while stomach ulcer is primarily a problem related to various medications. Even though *H. pylori* infection has been identified as one of the primary causes of peptide ulcers. The sole cohort study on *H. pylori* infection that was prospective, population-based, and did not consider putative virulence factors was one of the few (Brenner et al. 2007).

Gastric cancer

About 90% of cases of stomach cancer are caused by *H. pylori* infection. In 2018, there were 812,000 cases of gastric cancer, including non-Hodgkin lymphoma of the

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gastrointestinal site, which represents 37 percent of all cancers caused by a persistent infection, making *H. pylori* the most widespread pathogen associated with carcinogenesis (Fujioka et al., 2003). There are considerable geographical differences in the prevalence of gastric cancer, with Asia and Eastern Europe having the highest rates. Depending on ethnicity and environmental circumstances, people with *H. pylori* infection have a 1-5% lifetime threat of developing stomach cancer. Following *H. pylori* infection, some cultures are more likely to develop stomach cancer (Sasazuki et al., 2006).. Furthermore, cultural groups in the USA, especially Asian Americans, and indigenous populations around the world 64 have significantly greater rates of stomach cancer than the general population. Socioeconomic, nutritional, and lifestyle elements, such as smoking and salt intake, all have a part in the development of gastric cancer, but *H. pylori* infection takes precedence over all other factors (Watanabe et al., 2012; Yoshida et al., 2014).

Extra-gastric diseases

H. pylori infection is linked to unexplained vitamin B12 insufficiency, iron deficiency anemia, and some instances of immune thrombocytopenia. Immune thrombocytopenia has been linked to antigen mimicry-induced autoimmunity caused by *H. pylori*. The constant and least intense systemic inflammation that is linked to *H. pylori* infection is also connected to other diseases that don't originate in the stomach, such as cardiovascular diseases, metabolic syndrome, and neurodegenerative diseases (Brenner et al., 2007; Weck & Brenner, 2008). Just a few, largely observational research has shown a remarkable reduction in some of these indications when *H. pylori* is eliminated, and the majority of these relationships are based on scant data and remain indeterminate (Brenner et al., 2007).

Non-steroidal anti-inflammatory medicines

Non-steroidal anti-inflammatory medicines are widely used to treat inflammation of the joints and discomfort (NSAIDs). The increased morbidity and mortality among NSAID users may be due to its severe gastrointestinal (GI) side effects, which include GI mucosal erosions, ulcers, and ulcer complications including hemorrhage and perforation (Yoshida et al. 2014).

It is sometimes assumed that a decline in the incidence of transmission is responsible for the recent decline in the prevalence of peptic ulcer disease. Many eradication trial data demonstrate improvement in gastric and duodenal PUD following infection eradication, but they do not provide information on how infection promotes the development of ulcers, which is crucial for their prevention (Yoshida et al. 2014; Shih et al. 2022).

We, therefore, intended to examine the relationship between infection and additional possible risk variables for duodenal and stomach ulcer illness in both Trans and observational studies. NSAIDs and infection both contribute to the growth of GDU. Hence it makes sense that throughout endoscopic trials, the incidence of GDU should have decreased even in the placebo groups (Liang et al., 2022; Rosenstock et al., 2016).

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The limits of cross-sectional research designs could be a factor in the observed discrepancy. The colonization of the stomach mucosa develops from nonatrophic gastroenteritis to glandular atrophy, to hyperplasia and carcinoma, and eventually to adenocarcinoma (Cho and Jin 2022).

MATERIAL AND METHODOLOGY

Study design

At the beginning of the trial, participants had been asked about their health status, sociodemographic traits, family history of diseases, medical history, and lifestyle factors. The study was done between 2020 and 2022. The ethics committees of the hospital's medical faculty approved the study. About 330 patients are having abdominal problems, most of them from the age of 45 to 75 years. The study was designed to check their history of diseases and their lifestyle of eating, sleeping, smoking, and other habits. Each participant provided written informed consent. Medical records discriminated between gastric and duodenal ulcers and verified self-reported incident PUD. Only ulcers diagnosed by a doctor were regarded as incident cases. The information was gathered from general practitioners if they did not make the medical records available (Cho & Jin, 2022; Schöttker et al., 2012).

Assessment of serologic test

At the beginning of the trial, participants' family physicians took serum samples from them, which were then stored at 80°C until analysis. Using an enzyme-linked immunosorbent assay, all samples were tested to determine the presence of immunoglobulin G antibody against *H. pylori* in general as well as against the cage of *H. pylori* (ELISA). For the measurement of serum levels of PG and *H. pylori* antibody titer, aliquots of completely separate serum from fasting blood samples collected as routine laboratory tests for the above-mentioned general health checkup program were used. According to the prescribed standards, the infection condition was determined, and results that were on the borderline were taken as negative. Serum levels of gastric juices were measured using ELISA (Brenner et al., 2007; Zhang et al., 2013).

RESULTS

Out of 330 women and men, 122 patients participated in the cross-sectional study. At the outset, their median age was 55, and 63% of them were men. 330 individuals (11.8%) in total disclosed having PUD at some point in their life. According to serology, 157 members (50.8%) had *H. pylori* infection. Infected people had somewhat more cagA-positive strains (50.8%) than cagA-negative strains (49.2%). About 35 subjects underwent follow-up and experienced PUD with 24 stomach and 14 duodenal ulcer cases. Age, education, smoking, aspirin use, or cagA-negative *H. pylori* inflammation did not affect the results. A lifetime prevalence of PUD with OR has been linked to *H. pylori* infection. In contrast to cagA-negative strains, which revealed a weak and statistically insignificant link, cagA-positive strains revealed a strong link.

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One individual can develop both duodenal and stomach ulcers. Daily users of local anesthetics, smokers, extra medication, and unhealthy lifestyles and participants with cagA-positive *H. pylori* infection had significantly higher odds of having PUD. The medical history of patients was carefully studied and Peptic ulcer was significantly more observed in men than women. These results showed that the men used more medications and also were smokers than women.

Together with age, gender, and *H. pylori* infection, other factors included in the multivariable model included education, smoking, sleeping habits, and family history of PUD. Due to the small number of cases in this and the reference groups, even though people with cagA-negative infection had a 3-fold higher infection rate than noninfected participants, this link was not statistically significant (Table 1).

Table 1: Potential Determinants of gastric ulcer and Duodenal Ulcer Incidence

Participants	Number	Education			Smoking		*H. pylori* infection	
		Matric	Intermediate	Graduates	Non-smokers	Current smokers	*H. pylori* +	*H. pylori*+/cagA-
Male	185	100	55	30	72	113	98	40
Female	145	120	15	10	145	0	77	35
Total	330	220	70	40	217	113	175	75
Age (years)								
45-55	37	15	12	10	12	25	26	6
56-65	142	42	65	35	48	94	87	35
66-75	151	75	65	11	74	77	92	44
Family history of peptic ulcer								
Yes	177	-	-	-	-	-	-	-
No	153	-	-	-	-	-	-	-
Daily use of analgesic drugs								
Yes	122	-	-	-	-	-	-	-
No	208	-	-	-	-	-	-	-
Prescribed low-dose aspirin								
Yes	185	-	-	-	-	-	-	-
No	145	-	-	-	-	-	-	-

DISCUSSION

The goal for the future is to give everyone access to a healthy, *H. pylori* free stomach. It is doubtful that *H. pylori* will drop to the point where it vanishes on its own within a reasonable amount of time. For avoidance of *H. pylori* related problems in a significant range of people, this technique may have positive health effects. However, there are drawbacks, including logistical issues, high medical expenses, and dangers associated with overusing medicines for concerns about escalating antibiotic resistance (Fujioka et al., 2003; Week et al., 2009).

For areas with a high occurrence of *H. pylori*, a novel idea for all-inclusive intra-familial *H. pylori* care was put forth. Considering the theory that *H. pylori* infection is most frequently

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transmitted within families, particularly in childhood, it suggests actively moving forward with test-and-treat procedures in family members as the index patient who has been identified with the illness. New antimicrobial medications are needed to precisely target *H. pylori* and prevent resistance in *H. pylori* and other bacteria as a result of the rapid rise in antibiotic resistance. With a direct bactericidal impact, colloidal bismuth subcitrate is still an option (Cho & Jin, 2022; Shih et al., 2022; Weck & Brenner, 2008).

Increased medication penetration into the gastrointestinal firmly and weakly adherent mucus layers is another strategy. The only layer to which conventional mucoadhesive particles often stick is the loosely adherent layer, and they are quickly transferred to the lumen by peristalsis. The tightly adhered mucus layer can be penetrated by some prospective mucus-penetrating polymeric nanoparticles. Thus, the development of polymeric nanoparticles may increase the efficacy of the transport of specific antibiotics or other medicines as opposed to *H. pylori* (Yoshida et al., 2014; Zhang et al., 2013).

Another method is to raise the medication's perforation of the gastrointestinal layer, which includes the layers of mucus that attach strongly and those that adhere weakly. Conventional mucoadhesive particles only frequently cling to the loosely adherent layer before being swiftly transported to the lumen by peristalsis (Watanabe et al., 2012). A few potential mucus-penetrating nanoparticles359 may pierce the firmly adherent mucus layer. Therefore, the development of polymeric nanoparticles may improve the delivery of particular antibiotics or other medications that are effective against *H. pylori* (Weck & Brenner, 2008). *H. pylori* is a microaerobic bacteria, but if oxygen-containing nanoparticles are introduced into the stomach mucus layer, it can become vulnerable to increased oxygen levels. Additionally, the current study addresses a variety of features of how *H. pylori* interacts with the gastrointestinal microbiome and will have an impact on future studies (Schöttker et al., 2012).

In this study, the lifetime prevalence of peptic ulcers was determined to be 11.8%, while the rates of stomach and duodenal ulcers among medical professionals were 1.36 and 0.6%, respectively. The family and gender history of gastric or peptic ulcer were two additional risk factors that significantly positively correlated with the results in line with other studies (Yoshida et al. 2014). The prevalence and incidence of gastric ulcers throughout a person's lifespan were similar to those found in other inhabitants' studies. Also, in line with earlier findings, we discovered a strong correlation between lifetime PUD history and self-reported daily analgesic drug use (Shih et al. 2022). A lifelong history of PUD was linked to daily life routines like sleeping, smoking, gender, and family history. Male sex, tobacco use, and family history were additional risk variables with PUD that were substantially linked. Interestingly, male patients had a stronger connection with ulcerations than female patients (Week et al. 2009). In the longitudinal trial, participants with a positive cagA infection with *H. pylori* had a 15% higher risk of ulcerations and a 3% higher risk of stomach ulcer illness. Additional evidence that *H. pylori* infestation contributes to the development of gastric ulcer illness came from our discovery of a significant two-fold higher risk of gastric ulcer disease in positive cagA *H. pylori*-infected people. Our results confirm earlier studies showing risk categorization by cagA serostatus

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is important (Rosenstock et al.; Liang et al. 2022). The research hypotheses that stomach ulcers are frequently produced by NSAIDs but duodenal ulcers are rarely caused by NSAIDs were supported by the longitudinal analysis. Before analyzing the outcomes, the following points must be made. The study's participants are not a genuine random sample of the population because they were chosen during a volunteer health examination (Sasazuki et al. 2006). We discovered that people with *H. pylori* infections of the cagA positive subtype had significantly higher risk infections. More research should be done on newly discovered virulence factors that may affect PUD development as well as potential hereditary causes of the illness. This result highlights the importance of quitting and avoiding smoking in the context of PUD. Using serology to assess infection status may have led to some infection status misclassifications despite the exclusion of people with persistent atrophic gastritis (Nighat et al. 2022). Participants in the study may have misclassified their disease state and been unable to distinguish between gastric and duodenal ulcers. Gastroscopy was not practical in this large group due to logistical issues and the hazards involved, even though it would have been necessary to diagnose or rule out asymptomatic PUD (Weck and Brenner 2008). Even though we considered a few potential key factors. Moreover, the *H. pylori*-PUD link in the longitudinal study is due to unanticipated clearance of the *H. pylori* infection or the prescription of eradication therapy after baseline. In terms of infection of *H. pylori* and outcomes, there were few missing covariate values, and participants with missing explanatory variables did not differ significantly from subject areas without missing values (Brenner et al., 2007).

CONCLUSION

Despite the aforementioned limitations, our study demonstrates that infection of *H. pylori* is a significant risk factor for both stomach and duodenal ulcers. An unusually substantial connection to duodenal ulcers was shown by longitudinal research. Our results further demonstrate the importance of the risk of *H. pylori* infection increased with the usage of extra medication, unhealthy lifestyle, and with cagA-positive *H. pylori* strains. It is possible that a greater proportion of PUD than previously believed is caused by *H. pylori* infection based on the strength of the relationships discovered in longitudinal analysis.

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